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# Applying the FACTS? Framework: A Dual Example Case Study

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## Abstract

Visual misinformation is present in many formats, including graphs, user-generated images, and photographs. Although information literacy methods such as the CRAAP method or the RADAR framework are widely used to prevent the spread of verbal misinformation, new visual literacy methods are still relatively underexplored. The FACTS? method is applied to a comparative analysis of two graphs. Using a qualitative visual analysis, this study evaluates graph format, axis construction, color choice, title framing and source presentation. The findings suggest that the FACTS? method can be applied when comparing visual elements associated with information and misinformation. The use of two comparative graph cases enables deep, qualitative analysis of visualization strategies in a targeted case study. The findings of this paper highlight the need for further development in visual literacy education and continued exploration of the FACTS? method.

**Keywords:** FACTS?, visual misinformation, visual literacy, education

## Introduction

Visual misinformation efficiently conveys misleading, or incorrect information in a visual format such as graphs, videos and images. Because people process visual information more quickly than textual information, visual misinformation is particularly dangerous (Thorpe, 1996; Amenta, 2012). Malicious users may use tricks such as skewed axes, misleading titles, and emotionally suggestive color choices in graph design to spread misinformation (Lo, 2022). Although many researchers have developed effective information literacy methods such as the CRAAP method, RADAR framework and SIFT method to address verbal misinformation, current visual information literacy methods are limited in both amount and scope. As a result, visual information literacy is a still-developing area of research and instruction (Zak, 2024a). Through a comparative analysis of two graphs, the FACTS? method is applied to structured visual evaluation of features associated with visual misinformation. By examining graph format, axes scale, color usage, title framing and source transparency, the study explores how the framework organizes the identification of visual features associated with visual misinformation. Because the FACTS? framework remains relatively new, further research into its application and instructional use in educational settings will contribute to current visual literacy scholarship.

Although visual literacy and misinformation research have been developed in parallel, there is limited research that evaluates structured, applied framework designed specifically for analyzing visual misinformation. While existing studies focus on their institutional approaches to visual literacy, or identifying specific elements of deception in graphs and images, fewer research exists that uses an existing framework that discusses the elements of a visualization within the context of the image. This current gap highlights the necessity of examining newer frameworks such as FACTS?, which provides a systematic approach to assessing visual information and identifying features associated with misinformation.

## Literature Review

The following section explores current literature on information literacy tools and developments in visual information literacy. Although research in visual literacy has expanded, there is still no widely accepted method for evaluating information visualizations. Visual literacy is a skill that requires strategy rather than passive viewing.

People do not simply look at images; they interpret meaning through context and prior knowledge. One of the most widely recognized approaches for developing these interpretive skills is Visual Thinking Strategies (VTS) (Yenawine, 2013; Chin,

2017; Rautiainen & Jäppinen, 2017). Yenawine and Housen describe VTS as a discussion-based approach that encourages viewers to explain what they see and support interpretations with evidence from the image (Yenawine, 2013). Chin (2017) similarly found that VTS and Aesthetic Education approaches strengthened interpretive skills among K–12 students through guided discussion, while Rautiainen and Jäppinen (2017) connect VTS to more reflective and critical forms of analysis.

Other studies measure visual literacy more directly. Kiper et al. (2012), for example, developed the Efficiency of Visual Literacy Scale to measure general visual literacy ability. However, the scale focuses more on broad interpretive skill than on the ability to identify misinformation in real-world contexts. Shivers et al. (2017) and DeSantis and Housen (2009) also emphasize the role of design in shaping interpretation, arguing that viewers make meaning through the interaction of visual elements over time rather than through any single feature alone.

This is more relevant in visualization research. Fan et al. (2022) show that manipulated axes can significantly distort how viewers interpret trends, while other studies identify additional influential elements such as color, chart type, and framing. At the same time, many of these elements are often studied separately rather than together as part of a larger visual system. More broadly, visual literacy is widely considered important, but researchers still struggle to translate it into consistent methods for evaluating visual information (Zak, 2024a). As a result, frameworks specifically designed to identify visual misinformation remain relatively limited.

Current research has also identified several patterns commonly associated with misleading visualizations. These include emotionally charged or distracting color schemes, persuasive, simple titles, and skewed axes (Zak, 2023; Zak, 2024b; Zak, 2024c). In contrast, more reliable visualizations often use neutral color palettes, descriptive (albeit potentially hard-to-read) titles, and more proportional axis scaling (Kim, 2016; Lo, 2022; Correll, 2020; Zak, 2023; Zak, 2024b). However, researchers caution against treating these elements as automatically deceptive. Matatov et al. (2022), for example, found that even unedited images may function as misinformation when removed from their original context. Similarly, Lo et al. (2022) note that design choices made for readability or aesthetics often influence interpretation. Lisnic et al. (2023) therefore argue that interpretation depends heavily on context rather than isolated visual features alone.

The literature has an obvious gap. While many studies identify individual features associated with visual misinformation, fewer studies explain how these elements interact within complete visual systems or how they should be evaluated together. Existing research frequently discusses color, titles, and axis manipulation independently, but there is less agreement on their combined influence on interpretation. As a result, visual literacy research lacks broadly accepted applied frameworks for evaluating visual misinformation.

Based on this literature, this paper investigates the following question:

How can the FACTS? method identify elements associated with visual misinformation in comparative graph analysis?

## Methodology

This study uses a comparative case study with two researcher-constructed visualizations. The design allows for direct comparison of how the FACTS? method structures visual analysis. A two-case comparative design is used. This study's purpose is to examine how the FACTS? framework can operate across two contrasting visualizations. The FACTS? method is a visual analysis framework designed by Elizabeth Zak. It outlines specific elements of visualizations and their role in communicating correct information or misinformation. FACTS? stands for Format, Axis, Color, Title, Source, and ?. "Format" refers to the format of the image: if it is a graph, photo or other type of image. "Axis" identifies the x/y axis of an image, or the scale of an image. For example, if the axes are skewed, or begin at inappropriate increments, the image may convey incorrect information. "Color" focuses on the colors used in the image: what subtextual messages the creators of the image are trying to convey. Title recognizes the title of an image, or graph. It can also refer to the description, or accompanying text for an image. Source acknowledges the importance of the source of the information. If information seekers cannot identify the source of the graph

or the information accompanying it, then the graph may be less reliable. Finally, ? reminds the information seeker that even if a visualization appears to convey information, following all proper steps for an effective, non-misleading image, it may still effectively communicate misinformation (Zak, 2024a). The FACTS? method provides a structured approach for evaluating common features associated with visual misinformation. Because axis manipulation, color usage, title framing, and sourcing have been independently identified in prior misinformation research, the framework offers a useful exploratory method for visual analysis.

This paper applies the FACTS? method to two visualizations. To control the variables, two original graphs were designed. The two visualizations were constructed as contrast cases: one aligns with common elements of information visualization and the other highlights common elements of misinformation visualization. A dual-case design is used to meaningfully compare two visualizations. This comparison examines how the FACTS? method works in informative and misinformative visualizations. Current, neutral data are used in this study. A low-stakes topic was selected to avoid sensitive misinformation issues. Neither visualization is a perfect example of information or misinformation, but both are grounded in current research. Each visualization was designed with specific visualization elements including axis scale, color usage, title framing and data distribution. The elements were selected because prior research links them to interpretation of visualization. This study is exploratory rather than fully evaluative. Control over key visual elements is enabled through the researcher-generated visualizations.

The FACTS? categories were applied in sequence (Format, Axis, Color, Title, Source, and ?). Each visualization was analyzed using the FACTS? method. For each category, the corresponding element was examined. The visualization was examined for features associated with potential visual misinformation such as skewed axes, unclear sourcing or manipulative framing. This application of the framework enabled a qualitative assessment of the visualization.

## Results

Image 1 is first described, followed by analysis of the visual design features.

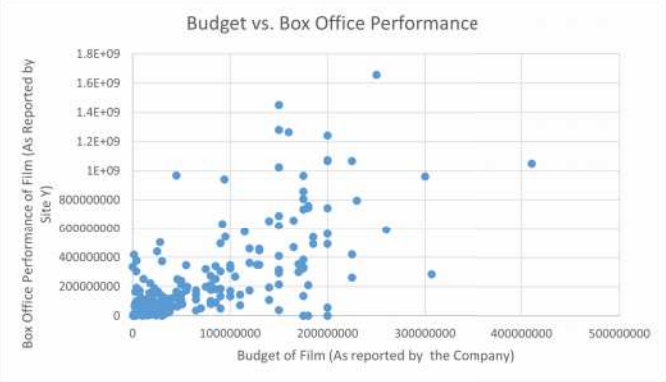


**Figure 1:** The graph is a bubble chart.

A-The x axis for the graph is clearly labeled as the Budget of the Film, and the y axis for the graph is clearly labeled as the Box Office Performance of the Film. The x axis begins at 0, and increases in consistent increments up to 50,000,000,000; the y axis conversely begins at 0 and increases in consistent increments up to 1.8 E +09. Although many data points are clustered near the lower range, this reflects the distribution of the dataset. The axis increments are consistent and evenly spaced. Neither axis shows signs of distortion.

C-The color used in the graph is a uniform shade of blue, which minimizes visual emphasis on individual data points. The visualization does not use color to encode additional variables or emphasis.

T-The title of the graph is "Budget vs. Box Office Performance." This summarizes the graph without any external opinions, or focus. This title describes the relationship between the two variables.

S-Sources are reported on the graph.

?-Further interpretation is necessary.

Based on FACTS? Image 1 aligns more closely with informative design characteristics. Image 1 is consistent with informative visualization design, though further validation of data sources is necessary.

Image 2 is then described and analyzed in the same manner.


**Figure 2:** The format of this image is a bubble chart.

A-The axes of the graph are inconsistent in scaling and interpretation. The x-axis represents movie length and begins at 0, ending at 180, with increments of 20 minutes. However, all values fall between 20 and 160 minutes. The y-axis represents movie earnings and includes values from -1.8E+09 and ending value of 2.2E+09. However, because movies cannot have negative earnings, the y axis should have begun at 0.

C-The colors of the graph are confusing, as the bubbles are red with a green outline. For an individual who is colorblind, the bubbles would appear a different color than red and green.

T-The title of the graph is "Short Movies Earn More." This presents an idea already: short movies earn more than longer ones.

S-There are no sources cited in the graph. This contributes to characteristics typically associated with misleading visual design.

?-Further sources should be consulted.

Image 2 contains multiple features associated with misleading visualization design. These include axes construction, title framing, color choice, and lack of sourcing. Further evaluation of the underlying dataset would be necessary for full interpretation.

## Discussion

Differences between the two images, the FACTS? method's use in evaluating the images, and future research evaluating and continuing use of the FACTS? method are discussed below.

### The Major Differences Between Each Image:

When comparing image evaluation using FACTS? between Image 1 and Image 2, it is important to identify the major differences between the images themselves.

These major differences may be summarized in Table 1. Specifically, for the purpose of this table, key elements of each graph as they relate to the first five elements of the FACTS? method are summarized below.

**Table 1:** FACTS? Elements as identified in images

| FACTS Element/Images | Image 1 | Image 2 |
|---|---|---|
| F-Format | Graph, Bubble chart | Graph, Bubble Chart |
| A-Axis | X axis: begins at 0, ends with 50000000000, has increments of 10000000000<br>Y axis: begins at 0, ends at 1.8 E +09, has increments of 20000000000 | X axis: begins at 0, ends at 180, has increments of 20 minutes<br>Y axis: begins at -1.8E+09, ends at 2.2E+09 |
| C-Color | Blue bubbles<br>Black axis lines | Red and Green bubbles<br>Black axis lines |
| T-Title | Budget vs. Box Office Performance | Short Movies Earn More |
| S-Source | Only one source listed | Source not listed |

While the graphs are similar in type of graph: bubble chart and graph, they have very different axes, colors and titles. Difference in axes, colors and titles do not inherently signify information or misinformation: visual information and misinformation share many different colors, scales and verbiage. At a glance, an information seeker may consider that the two graphs may differ in their informative or misinformative nature. However, this first glance must be followed by the FACTS? method.

### The FACTS? Method's Use

After seeing the two graphs, an information seeker could then utilize the FACTS? method. The FACTS? method further identifies the implications of the major differences between the graphs. Table 2 presents these implications.

**Table 2:** FACTS? Elements as implications in images

| FACTS? Element/Images | Image 1 | Image 2 |
|---|---|---|
| F-Format | graph type is appropriate for data | graph type is appropriate for data |
| A-Axis | unskewed and appropriate for data used | skewed and inappropriate for data used |
| C-Color | color does not distract from the image | color is confusing and distracts from the image |
| T-Title | title is not misleading and is informative | title is leading and presents a specific argument |
| S-Source | although the source presented is appropriate, further evaluation is necessary | no source presented, implies that no source having been used |
| ?-Question | This graph presents questions such as further evaluating the source | This graph presents questions, including further evaluating the source |

Examining the two images under FACTS? shows their informative or misinformative nature. Image 1 has two unskewed axes, a uniform set of colors, and a relatively informative title. Image 2 has two skewed axes, a bizarre set of colors, and a title meant to sway the information seeker's interpretation. Neither graph contains a perfect description of sources. Likewise, it is important to note that whether informative or misinformative, an information seeker must likewise question the information they have obtained from the visualization.

## Effectiveness of the FACTS? Method

Although the FACTS? method does not conclusively state that either graph is informative or misinformative, it clearly identifies some major vehicles of information or misinformation. An information seeker would be able to further identify sources that would help them conclusively identify the graphs as informative or misinformative. However, even if the information seeker did not conduct their own external research, they would be able to understand that Image 1 contained information and Image 2 contained misinformation. Therefore, it is reasonable to conclude that the FACTS? method is effective for information seekers. Wider spread information literacy education is essential for combatting misinformation, and this education must include the FACTS? method.

## Limitations

This study contains limitations. Designing my own graphs for evaluation may have skewed the results. However, while current graphs exist or may be generated using artificial intelligence, designing graphs provided a proper format for the research.

## Conclusion

In order to understand whether a method is useful, it is important to test it through applied examples. This study applied the FACTS? method to a comparative case analysis of two researcher-constructed visualizations. The comparison showed how the framework can be used to identify and organize key visual elements such as axis design, color choice, title framing, and source use. Between the two images, the FACTS? method helped distinguish differences in how each visualization communicates information. Image 1 was assessed as more consistent with informative visualization design, while Image 2 contained multiple features that may increase the likelihood of misinterpretation, particularly in relation to axis scaling, color usage, and title framing. However, these findings are limited by the small sample size and the fact that the visualizations were researcher-designed. Because of this, the study does not fully establish the effectiveness of the FACTS? method, but instead shows how it can be applied as an exploratory tool in comparative visual analysis. Further research should apply the FACTS? method to a wider range of real-world visualizations to better evaluate how consistently the framework works across different cases and contexts and help strengthen its usefulness for visual literacy education and misinformation analysis.

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